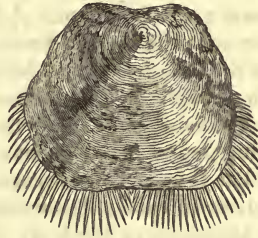


3. *Rhynchonella psittacea* was moderately abundant in the extreme north, from Tromsøe to the North Cape, in a living state, in 70 to 150 fathoms water. Dead valves were found at Hammerfest in mud. I found *Rhynchonella* very difficult to examine, the animal being extremely timid and closing its valves on the slightest movement. The coiled arms are extended, so that the cirri when unbent come as far as the margin of the shell. I have frequently seen this species with its valves open, but it never protruded its arms.



Rhynchonella psittacea.

4. *Crania anomala*, Müll. sp., was met with between Drontheim and Tromsøe, attached to stones, shells, &c., in 40 to 150 fathoms water; the cirri are protruded, but not the arms, beyond the margin of the shell. The valve opens by moving upon the straight side as on a hinge, without sliding the valve.



Crania anomala, Müll. sp.

XXIV.—On the Young States of some Annelides.

By R. LEUCKART*.

[With a Plate.]

IN his copious "Observations on the Anatomy and Development of some Invertebrate Marine Animals," Busch has figured (pl. 8. figs. 1-4) the larva of an Annelide of unknown origin, which is particularly remarkable in many respects, and especially from its possession of strong spines and fringes of cilia upon the individual segments. In the spring of 1853 I not unfrequently took similar larvæ from the surface of the sea near Nice and Villa Franca. The stage of development in which they occurred agreed pretty well with that observed by Busch, at least in most of the specimens: younger larvæ were never found, but some occurred which had proceeded a little further, and these proved their increased development especially by the partial or even complete loss of the above-mentioned spines. When the temporary nature of this peculiar apparatus of bristles was established, it was tolerably easy, by the consideration of the other

* Translated by W. S. Dallas, F.L.S., from Wiegmann's Archiv, 1855, p. 63.

characters, to ascertain the pedigree of our larva, or at all events its nearest allies. These, in my opinion, are to be found in the family of the *Ariciæ*, and indeed in the group with two long tentacular cirri (*Ariciæ Naideæ*, Oerst.; *Spioidea*, Grube), probably amongst the species of the genus *Spio* or *Nerine*.

Before setting forth the reasons in favour of my supposition, we must first of all get a good notion of the larva itself; especially as Busch's statements do not take up every point, and are also erroneous in this respect, that he treats the dorsal surface of the worm as the ventral surface, and *vice versa*.

The most developed individuals that occurred to me (Pl. VII. fig. 1) measured $2\frac{1}{2}$ lines and were of a brownish colour. They were rather slender, about $\frac{5}{12}$ ths of a line in width anteriorly, tapering towards the hinder extremity and flattened on the back, so that the height of the body (fig. 3) was scarcely more than half its breadth. They swam, at least so it appeared to me, almost exclusively by the action of the circlets and rows of cilia, the arrangement of which has already been described by Busch. As soon as they were interrupted in their movements, they rolled themselves up into a flat spiral and sank to the bottom.

The segments of the body (fig. 1) had already attained a considerable number (about fifty). They exhibit a very uniform structure, but gradually decrease in development from before backwards. The head consists of a short, broad, nearly quadrangular tubercle, which is but indistinctly separated from the first segment of the body, and bears, between the rounded anterior angles, a short tentaculiform process (frontal tentacle) of a conical form. The upper surface of the head is furnished with four black ocelli placed at a considerable distance from the median line, and standing in a line which is but slightly curved backwards. The posterior and inner eyes are the largest, and are sometimes divided on one side into two spots placed close together. No refractive media could be found in them. At each side of the head there is a very considerable tentacle (a tentacular cirrus) which arises from the angle between the head and the protuberant upper lip, and curves backwards like a horn over the first segment. Where this meets the upper lip, the latter bears a tuft of long cilia, which Busch has regarded, certainly correctly, as the remains of the crown of cilia.

The anterior segment of the body is produced forwards at the ventral surface almost to the base of the frontal tentacle (fig. 2), and here forms a lip-like protuberance in front of the mouth; this is the upper lip already mentioned, which at the same time marks the boundary between the buccal segment and the head. Even without this process the first segment of the body is the longest, although on the back it only measures about one-third of its

width. The next following segments certainly yield but little to this in length, but the later ones from about the middle of the body diminish rather rapidly to a considerable extent. On each of these segments four pedal tubercles (fig. 3) may be distinguished (not two, as stated by Busch); two of them are dorsal and two ventral, they are placed on the nearly perpendicular lateral surfaces, and have the form of slight, but very distinctly marked elevations. The bristles of the two pairs of pedal tubercles are of different forms; the dorsal tubercles contain edged capillary bristles (fig. 4), the ventral ones on the contrary extended uncini, the ends of which (as shown in fig. 5) form two unequally developed teeth. As is usually the case under such circumstances, the capillary bristles are the longest. The number of bristles diminishes gradually towards the hinder extremity; on the anterior segments it amounts to six or seven, on the posterior ones only to two or three. Above the dorsal pedal tubercle there rises a slender cirrus, clothed with short cilia; the length of this is however constantly less than that of the bristles, even in the anterior half of the body.

The segments are further distinguished by the peculiar ciliary lobes or combs described by Busch (figs. 2 & 3), which are situated on the ventral surface and occupy about the middle of the space between the ventral pedal tubercles and the median line. The cilia of which these are composed agree in size and development with the remains of the ciliary wreath, at least on the anterior segments, but they gradually diminish considerably both in size and number as we proceed backwards. In front I not unfrequently counted twelve or even more hairs, standing regularly close together in a transverse line; on the hinder segments there were only from six to eight. The two first segments of the body form an exception to this, as they are quite destitute of these ciliary combs, but instead of them are covered on the ventral surface with a uniform soft coat of cilia.

The last segment of the body is destitute of bristles, but is considerably broader and longer than the preceding rings. It forms as it were an annular protuberance around the anus, and is margined with a circle of powerful cilia.

Of internal organs the intestinal canal alone could be distinguished; it exhibits a very great development in our animal. Its commencement forms an œsophagus, without a protrusible proboscis or any armature; but with fleshy walls, which are dilated on each side into tolerably wide cæca in the second, third and fourth segments. In the fifth segment the stomach commences; it contains a greatly developed, yellow glandular layer, by which it is very clearly distinguished even at the first glance from the œsophagus; although it appears otherwise to be only

a direct continuation of the latter. This appears also, especially as the stomach possesses the same lateral cæca as the œsophagus; these indeed gradually diminish posteriorly and entirely disappear about the second third of the body, but at the same time (with the exception of the first cæcum) appear very much longer and more considerable than the corresponding processes of the œsophagus. The glandular layer of the stomach is lost upon the intestine, where it is replaced by a greater development of the muscular membrane. The muscular walls, as in the œsophagus, are marked with black pigment spots.

The preceding description only applies exactly, as has been said, to the most developed specimens of our worms; the younger ones are not only smaller and furnished with a less number of segments (35 to 50), but are also particularly distinguished by the toothed bristles or spines described by Busch. Where these spines were still most completely retained, I observed in the first place a strong tuft on each side of the first segment of the body, inserted upon the dorsal surface behind the tentacular cirrus (fig. 2), and consisting of three or four, or sometimes only two very large shafts, which were armed with short spine-like teeth, and extended nearly half the length of the body. The other segments bore similar, but very much shorter spines, which were also upon the dorsal surface above the dorsal cirrus (fig. 3), but never more than two together. The length of these spines, on the anterior segments at least, might be about equal to the breadth of the segment to which they belonged, but they gradually diminished in length posteriorly, as Busch has already stated. Similar organs were never found between the pedal tubercles.

It is difficult to suppose that the loss of the spines in the larger specimens is only accidental. For this, the number of the spineless individuals was too large. Moreover the spined specimens universally exhibited the greatest variety in the number of their spines and in the presence of these upon the individual segments. Sometimes the spines of the anterior segment were wanting, whilst the others were still uninjured; sometimes it was the latter that were absent to a greater or less extent. Occasionally specimens were found (like fig. 1) which only possessed a few (two or three) spines on some particular spots of their bodies.

Under such circumstances I have no hesitation whatever, as indeed has already been observed, in regarding these remarkable appendages as a temporary adornment. But it is probable that these spines do not constitute the only provisional organs of our larvæ. The circles and combs of cilia may also doubtless be placed in the same category, for the developed Annelida, as far

as we know with certainty, are always destitute of such apparatus. It is true that Quatrefages professes to have observed some small Annelida with permanent tufts of cilia, but the animals in question are still but imperfectly known,—still less have they been ascertained to be fully developed species.

If we leave these bristles out of the question, there remains a slender worm, with an eye-bearing cephalic tubercle, and two tentacular cirri, with a simple (not protrusible) unarmed œsophagus, slightly developed dorsal cirri, and differently formed simple bristles in the pedal tubercles, which are also but slightly prominent. Of course many changes take place in this animal before it arrives at its perfect development and sexual maturity, but these will hardly be of great importance; they will probably be confined to the enlargement of the tentacular and dorsal cirri.

If we consider this proved, there can be little doubt as to the systematic position, or, which is the same thing, the origin of our animal. Our worm is one of the so-called *Dorsibranchiata*, and indeed belongs to the family of the *Ariciæ** as circumscribed by Oersted (Wiegmann's Archiv, 1844, i. p. 103). The existence of a single pair of tentacular cirri refers it to the group of *Ariciæ Naidinæ*, and the uniform structure of all the individual segments of the body places it under the genus *Nerine* or *Spio*. Without a knowledge of the mature form, it is difficult to decide to which of these two genera the worm belongs; this will depend especially upon the subsequent condition of the apical segment, which in *Nerine* is provided, as is well known, with a sucker-like circle of papillæ.

Of the two genera above mentioned, we know at present in the Mediterranean only a single representative, and that but imperfectly—the *Lumbricus cirratulus* of Delle Chiaje. At the moment I have unfortunately no opportunity of consulting the Memoir in which this worm is figured (tab. 64. fig. 16), and must therefore leave it undecided whether our larva may be referred to this species.

The developed *Spiones* and *Nerinae* live in mud, where they form regular passages and tubes; the free pelagic life of our larva is therefore subsequently, probably after the loss of the cilia, exchanged for another and very different residence.

If, however, further proofs of the derivation of our larva from a Spioid Annelide be required, we need only refer to the

* For comparison of the form of the bristles I may refer here to my description of *Leucodore mutica* (Wiegmann's Archiv, 1849, i. p. 200). With regard to the structure of the œsophagus I may also mention the genus *Aonis*, which, according to my observations (Wagner's Zoot. ii. p. 307), in this respect agrees most closely with our larva.

similarity existing between it and the supposed larva of *Leucodore ciliata*, figured by Oersted (Consp. Annul. Danic. tab. 6. fig. 96). It is true that I have not this figure by me at present, but as far as I can remember, exactly the same powerful bristles occur in this, which so remarkably characterize our larva in the first period of its life, and these are also exactly similar in arrangement and development. I am not certain whether Oersted has recognized the peculiar structure of these bristles, but I scarcely think he can have done so, as otherwise I should hardly have approximated to it a larva with simple (permanent) bristles which I found in Heligoland, as was the case in the papers which I published in conjunction with Frey (p. 99).

Similar temporary bristles occur however in other Annelidan larvæ, and even in some which are considerably removed from our animals. I will not refer to the larva figured by Busch (tab. 7. figs. 5 & 6) as an example of this, as its derivation is still entirely unknown, and it might possibly be nearly allied to our *Spio*. But I may recall the fact that Quatrefages has described an exactly similar structure in the larva of the genus *Hermella* (Ann. des Sci. Nat. 1848, vol. x. p. 153). It is true that there are no observations as to the subsequent shedding of these bristles, but nevertheless there can be no doubt upon the point, for the developed *Hermellæ* are destitute of them, as I know from my own observations. These bristles have nothing in common with the paleæ afterwards possessed by the animal.

So much for the spinous Annelidan larva from Trieste and Nice and its genetic relations, which, I hope, have been pretty correctly recognized. Let us now pass to another larva, also discovered and described by Busch, which is figured on tab. 9. figs. 1-8 of the work above quoted, and which has a great resemblance to the *Mesotrocha sex-oculata* of the same observer.

We have recently obtained information as to the origin of the latter from Müller (Monatsber. der Berl. Akad. 1854, p. 395). We now know that it is the larva of the *Chatopterus Norvegicus*, discovered by Sars. With this information we may probably explain the second *Mesotrocha*, found by Busch at Trieste. It may probably prove to be the larva of the *Chatopterus pergamentaceus* (*Tricælia variopedata*, Ren.), found at Trieste, of which I have given a more exact description in Wiegmann's Archiv for 1849, p. 340. On a previous occasion (Gött. Gel. Anz. 1852, p. 857) I expressed the opinion that we might perhaps suppose the Annelidan larvæ of the *Mesotrocha* type to be the descendants of a *Serpula*, or of some other worm in which the segments of the anterior part of the body were distinguished, as in *Serpula*, from the other segments by the form, structure and position of the pedal tubercles; and, in fact, this supposition

appears now to be completely justified, although the determination of the species was incorrect.

The connexion between the *Mesotrocha* of Trieste and the *Chaetopterus pergamentaceus* is rendered in the highest degree probable by the structure of the bristles. The same forms which Busch has figured from the segments before the circle of cilia in his *Mesotrocha*, have also been observed and described by me on the anterior part of the body of our *Chaetopterus*. Even the peculiar broad bristles which Busch found upon the fifth segment of his larva reappear in the mature worm (but on the fourth segment), only they are less distinctly serrated, and occur in greater number,—as indeed the number of bristles in general is much more considerable in the mature state.

If we are once convinced of the identity of *Mesotrocha* and *Chaetopterus*, it becomes easy to refer the two forms to one another, and thus, even without direct observation, to obtain a tolerably complete view of the metamorphoses of the animal in question.

I have shown, as above quoted, that *Chaetopterus* is furnished, like the other Annelida, with a true cephalic tubercle. In the developed state this part is certainly very rudimentary, so that it might previously have been overlooked; but in the larva it is very greatly developed, and appears produced over the mouth into a disc, like an upper lip*. To this upper lip in the larva a bilobed lower lip is opposed, the two lobes of which only require to be fused together to form the peculiar labial apparatus of the mature animal. The two tentacles placed in our larva at the sides of the mouth also occur in *Chaetopterus*, according to my observations, although much less developed in proportion, and, to a certain extent, aborted, like the cephalic tubercle and the eyes.

The segments which in the larva intervene between the head and the circle of cilia form (together with the head) the fore-body of the mature animal. But their number still requires increase; Busch only counted nine segments, whilst in my worms there were twelve or thirteen. The new segments are evidently formed at the hinder extremity of the fore-body; that is to say, between the fore- and middle body, as sufficiently appears from the position of the above-mentioned serrated bristles; this, as far as I know, is the only instance of the kind amongst the Annelida. With the last segments of the fore-body, *Mesotrocha* is also destitute of the large wing-like

* From the formation of the head in the larva, it is established beyond a doubt that Sars has really, as I formerly stated, taken the back of *Chaetopterus* for its belly.

appendages, which, according to my view, are produced by the metamorphosis of the last pedal tubercles of that part of the body, as also of the uncini which I have indicated on its last two segments.

The second division of the body in *Mesotrocha*, which commences with the circle of cilia, represents the middle and hinder parts of the body of our *Chatopterus*, but apparently requires a still greater increase for its complete development, as Busch only counted eleven segments in this part of his larva, whilst in the mature state more than double the number occurs. When, however, Busch denies the possession of setose feet to this division of the body, he probably only had the subulate bristles of the anterior part of the body in his eye, for the eleven pairs of rudimentary feet with "longish oval bodies" which are inserted in them, undoubtedly represent setose feet, and are probably the first indications of the ventral tubercles furnished with uncini. Busch even states, that the inserted bodies are denticulated, as I have found to be the case with the uncini of *Chatopterus*. It is interesting also that these ventral pedal tubercles possess a bilaterally symmetrical distribution on all the segments, whilst in the anterior segments of the middle part of the body they are subsequently, as is well known, fused into a single median organ. The dorsal tubercles which occur on the abdomen of the mature *Chatopterus* appear to be developed subsequently.

My regarding the segments lying behind the circles of cilia as representing both the middle of the body and the abdomen of *Chatopterus*, arises from the observation of Busch, that the dorsal surface of these segments is gradually produced on each side, close to the median line, into a tolerably long and vibrating process. Busch considers these processes to be branchiæ, and concludes accordingly that *Mesotrocha* is the larva of a Dorsibranchiate Annelide; he consequently assumes that these processes are persistent in their original form, whilst in my opinion (which however is only founded on the supposed identity of our larva with the *Chatopterus* of Trieste) they are gradually converted, by growing together in the middle, into the scale-like appendages which communicate to the segments of the middle of the body, and also, although much less remarkably, to the first segments of the abdomen, their well-known lenticular or conical form. The development of these processes commences close behind the rings of cilia, and gradually extends thence backwards,—how far has not yet been observed. The oldest larvæ of *Mesotrocha* which presented themselves for examination, exhibited these processes fully developed only on the first four segments; consequently, exactly on those segments

which are subsequently converted into the middle body, and which, as is well known, present by far the largest appendages.

The mature *Chatopterus* lives in a free tube formed by itself. In this respect it is not without interest that we learn from Busch, that the larvæ observed not unfrequently exuded a slimy mass in the last days of their existence, with which they attached themselves to the side of the vessel in which they were kept.

I regret that during my residence in the Mediterranean I had no opportunity of becoming acquainted, by my own observations, with these interesting larvæ, which appear to possess rather a wide distribution. In this case it is probable that many other points of resemblance with the structure of *Chatopterus* would have been discovered. But in Nice the larvæ of Annelides are generally rarities, at least it was so while I was there. Except the spinose forms above described, only a few were discovered, and these mostly at a time when my attention was taken up with other investigations. Amongst these few there is however one upon which I may add a few words, although, properly speaking, the name of larva is no longer applicable to it, as it scarcely exhibits any traces of its provisional organs. It is a young *Alciopè* (*A. Raynaudii*), which I took up one day in the Bay of Villa Franca with a number of *Firoloides*, amongst which it was swimming about*.

The beautiful, transparent little animal (Pl. VII. fig. 6) measured $4\frac{1}{2}$ lines, and its body consisted of three distinctly separated regions,—the head with the neck, the true body, and a tail,—although the mature animal, as is well known, exhibits no trace of any such division†. The middle region was by far the largest of these divisions; it measured about three lines in length and nearly a fourth of this in breadth; it was broadest in the middle and gradually diminished a little towards the extremities, especially in front. In this middle region eight segments were distinctly to be recognized; they resembled those of the mature animal in every respect, so that I need not describe them particularly. But I may observe, that the bristles of the first pair of pedal tubercles were very much shorter and less numerous than those of the others, and especially the hinder ones, which were the most developed in every respect. The neck was considerably narrower than the foremost segment to which it was attached, and probably measured scarcely a third of the greatest breadth of the middle region. It was as long as broad, and exhibited three segments, or rather three pairs of segmental appendages,

* I also met with *Alciopè candida* several times in the Bay of Villa Franca.

† See Krohn, Wiegmann's Archiv, 1845, p. 171.

which certainly were greatly inferior in size to the corresponding appendages of the middle of the body, and were further distinguished from these by the absence of bristles, and of the black glandular pigment-spots, which, as is well known, are placed on the segments beneath all the other pedal tubercles. The appendages of the two hindmost pairs were cleft, that is to say, they each consisted of a dorsal and ventral cirrus, which however both possessed the same cylindrical form. The foremost segmental appendage on the contrary was perfectly simple, and appeared in the form of a small, stumpy cirrus, which projected close behind the eyes of the animal. The anterior part of the neck bore a distinct range of cilia, running round behind the eyes and mouth, which appears, from the observations of Krohn, to be persistent on the ventral surface. The head had already acquired exactly its future form and structure, but I could not succeed in distinguishing the central frontal tentacle, which, however, is but slightly marked even in the perfect animal. The globular eyes project on either side but little beyond the neck; it is well known that in *A. Raynaudii* they by no means attain the same colossal dimensions as in *A. candida*. Close to the mouth, and underneath the eyes, a very considerable tubercle stands out right and left, a kind of an upper lip, between the lobes of which an elongated disc-like lower lip projects from behind.

The caudal portion of the animal forms a narrow, stump-like appendage, which at its root is scarcely half so broad as the preceding terminal segment of the middle region of the body, gradually tapers to its apex, and is about 1 line in length (rather less than more). Microscopic examination shows that this tail is annulated; a number of narrow segments may be distinguished in it, which gradually diminish in size and development posteriorly. The foremost segments already possess the future dorsal feet with their bristles and black glands; these characteristics are gradually lost by the posterior ones, until about the last fourth of the tail, which forms an undivided mass with a rounded apex. I distinguished eleven distinct caudal segments (with bristles), and behind these two or three other indistinct (without bristles), which were just separated from the apical piece.

Regarding the internal structure I can say nothing that has not already been mentioned by Krohn. The nervous system is very distinct, at least as far as the middle of the tail, where it gradually withdraws itself from observation in consequence of the increasing opacity of the substance of the body. The anus lies at the extreme apex of the tail, so that the intestine passes through the entire length of the body. But it is only as far as

the root of the caudal appendage that it possesses, the structure described by Krohn. Beyond that point it narrows suddenly to about a fourth of its previous width, and then proceeds in the form of a thin straight tube to the anus. The only vessel observed was the pulsating dorsal vessel. Lateral glands are deficient.

The changes through which the worm has to pass before it returns to the perfect form of its parent, are of two kinds. In the first place the neck will gradually shorten and disappear, with the exception of its segmental appendages*, so that the head will appear to sit immediately upon the first pair of setose feet. The segments of the caudal appendage then gradually increase in number and become developed so completely, that at last the difference between them and those of the middle of the body is lost. The temporary existence of this distinction perhaps indicates, that a state of rest intervenes between the formation of the middle region and that of the posterior segments, during which the plastic processes are entirely confined to the development of the parts already formed. The formation of the posterior segments of the body as here exhibited, presents so remarkable a resemblance to the reproduction of the body after mutilation, that I should not have regarded our worm as a normal stage in the development of *Alc. Raynaudii*, if its small size, the structure of the neck, and especially the presence of a range of cilia behind the head, had not sufficiently indicated that it was an immature and undeveloped creature.

Supplementary Notice.

Long after I had sent the preceding sheets to the press, the 'Magasin de Zoologie' for the year 1843, with a paper by Quatrefages upon some new Annelides from Normandy, which had hitherto escaped my notice (and which is not even mentioned in Grube's Monograph), came accidentally into my hands. At pl. 3. fig. 7. of this work, a Spioid Annelide is figured under the name of *Malacoceros longirostris*, which from its appearance and the description annexed may probably be the mature state of the spinous larva observed by Busch and myself. The formation of the cephalic tubercle especially is perfectly similar, and it is from

* Krohn only mentions four tentacular cirri on each side in *A. Raynaudii*, but leaves it uncertain whether these represent the appendages of two or four segments. This point may perhaps be settled by my observations. On the other hand it must still remain undecided, whether the small foremost cirrus gradually disappears or has been overlooked by Krohn.

this also that Quatrefages has derived the name of his species. The length of the developed animal is from $2\frac{1}{2}$ to 3 inches,—that of the two tentacular cirri, 9 lines. The only thing that might perhaps be urged with reason against the identity of the two animals, is the circumstance that the first segment of the body, according to Quatrefages, is destitute of the dorsal pedal tubercle; but with regard to this point of difference I should be rather inclined to suppose that there is an error of some kind. Eyes are wanting in the developed animal, as in many other mature worms (and Mollusca) which possess those organs in their young state. The distinction which appears in this respect between the larvæ and the mature animals, only shows that Quatrefages has established his new genus *Malacoceros* without sufficient reason, for the want of eyes is the only character by which it is distinguished from *Nerine*.

The difference of habitat appears to be of no consequence, especially as our larva has a tolerably wide distribution. I certainly do not know where Busch observed his specimens; but J. Müller states (Arch. für Anat. 1854, p. 92) that he has found it at Marseilles. Müller however only speaks of a very "similar" larva, but, apparently, merely because his specimen wanted the long spines of the first segment. It is with reason that J. Müller also points out the great similarity that exists between the large spine-like bristles of our *Nerine* larvæ and the strong bristles of the singular *Mitraria*. I think that this circumstance may even justify us in supposing that the tufts of bristles in *Mitraria* are also mere larval organs. At any rate it seems to me that *Mitraria* is scarcely anything but the larva of an Annelide with a provisional apparatus of bristles, as indeed Müller himself has lately indicated (*loc. cit. sup.*). It is much to be regretted that Quatrefages could not follow the development of his *Hermella*-larvæ for a longer period; we should then probably have obtained further data for the elucidation of the species of *Mitraria*. I will not however assert directly that the *Mitraria* are actually larvæ of *Hermella*, for that would be going too far with our present knowledge, although the elongated capitate bristles, which J. Müller has described, together with the ordinary spines, in the species observed by him, remind one unmistakably of the forms of the peculiar palæ of the *Hermella*.

As regards *Mesotrocha* and its metamorphosis into *Chatopterus*, M. Müller has given his interesting observations upon this subject in full in the Archiv für Anat. und Physiol. 1855, p. 1. In connexion therewith M. Müller also mentions the larva discovered by Busch, the relations of which to *Chatopterus pergamentaceus* I have endeavoured to prove, and expresses his opinion that it does not belong to the genus *Chatopterus* itself,

but to some other, unknown, but very nearly allied worm. Since I have become better acquainted with the metamorphosis of the *Mesotrocha sexoculata* from Müller's statements, I must now agree with him entirely in this opinion. The course of development of *Mesotrocha*, which I took as the basis of my arguments, and could only deduce from the comparison of *Mesotrocha* with the mature *Chatopterus*, certainly agrees in general with this process as observed by Müller; but I was wrong in supposing that the lenticular processes of the middle segments of the body were produced by a fusion of the lateral dorsal appendages which occur in the larva described by Busch. The remarkable form of the segments in question is the result rather of a peculiar development of the bodies of the segments, without the participation of any segmental appendages, as indeed I had previously assumed, in opposition to the assertion of Audouin, in my description of *Chatopterus pergamentaceus*. On the other hand, M. Müller was able to convince himself, that the large wing-like processes on the last segments of the anterior part of the body in *Chatopterus* appeared at first only as simple dorsal processes, and it is remarkable that, like the dorsal processes of Busch's larva, they are immediately behind the circle of cilia, which, as is well known, is double in *Mesotrocha sexoculata*. It is possible therefore, that in the worms like *Chatopterus*, for a knowledge of the larval state of which we are indebted to Busch, four or more such appendages occur on each side instead of a single one; and it is also possible certainly, that the dorsal processes of the larva may really, as supposed by Busch, become gradually developed into branchiæ.

From the statements of M. Müller, it also appears that the characteristic distinctions between the two species of *Chatopterus* at present known are by no means of such a decided nature as one might perhaps have concluded from the difference in their size, and as was presupposed by me in the preceding analysis. This applies especially even to the structure of the bristles, which appear to be essentially similar in the two species, so that in my paper the name of *C. norvegicus* might be substituted throughout for *C. pergamentaceus* with equal right.

Under these circumstances I can of course only bespeak some consideration for my statements, in as far as they may place beyond a doubt the relations of the larva described by Busch to a (still unknown) form of the family of the *Chatopteridæ*.